

# Use of Health Services in a Rural Community

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**T**HE STUDY of the distribution and pattern of health care delivery, utilization, and the evaluation of its effectiveness in meeting the health care needs of a community are among the accepted principles of epidemiology (1). The methods of achieving this objective have been described by other investigators (2,3).

Despite the recognition of the potential value of epidemiology as a research tool applicable to health care services, its use seems to have been infrequent. In this report, the nature, distribution, and variation of health care services utilization are described according to certain characteristics of a specific population. Although the data are from Yolo County, Calif., and their use should be confined to the geographic boundaries of this county, the methods used and perhaps the findings could be applicable to similar communities.

## Methods

*Design of the study.* The basic approach of the present study was a cross-sectional population survey of the residents of Yolo County. The objective of the survey was to obtain information on specific questions of epidemiologic relevance, including demographic and socioeconomic variables, health care service utilization, health care expenditures, health status, unmet health care needs, and attitudes, opinions, and habits relating to health care in general.

*Study population.* The study population at the time of the survey consisted of 91,677 persons living in private, nongroup households within the

boundaries of Yolo County. Persons residing in group quarters such as dormitories and prisons were excluded. A private household was defined as all persons, regardless of whether related or not, who shared the same dwelling and had common arrangements for at least one principal meal a day. Information on certain socioeconomic, demographic, and health factors were collected on all members of each household selected for the sample.

*Sample design.* The households were selected by a two-stage stratified random sample. The 304 California State Department of Finance Enumeration Districts were used as the primary sampling units. Each enumeration district, a small relatively homogeneous area of the county, varied in size depending on its population density. Because of the heterogeneity of the larger census divisions

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defined by the Bureau of the Census, it was deemed impractical to use them as the primary sampling units. Individual households within each enumeration district were used as the secondary (ultimate) sampling units. The number of households within each district varied considerably. Consequently, the primary sampling units were selected with a probability proportional to the number of households in each district. The households within the districts chosen were randomly selected with equal probability of selection by the use of standard sampling procedures (4).

*Stratification.* In some areas of the county, sociodemographic characteristics of race, income, and occupation of the residents are somewhat homogeneous, but these characteristics are different from those of residents in other sections of the county. Therefore, the enumeration districts were divided into four strata commensurate with the general characteristics of the population of the county.

The cities of Davis and Woodland and the area known as "East Yolo County" (unincorporated areas of Bryte, Broderick, West Sacramento, and Clarksburg) are urban areas characterized by moderately high population density. The city of Davis is further distinguishable by its university oriented and relatively high income composition, and the East Yolo County area is distinguishable by the number of members of low income minority groups that live there. The balance of the county is characterized by small communities and farms. The four strata included:

Davis—the city of Davis which has a population of 26,322 and 7,314 occupied housing units and is a middle to upper class community.

Woodland—the city of Woodland which has a population of 20,602 and 6,447 occupied housing units.

East Yolo—the eastern region of the county, characterized as urban, which has high population density, low income residents, and light to heavy industry in the four communities of Bryte, Broderick, West Sacramento, and Clarksburg.

Rural Yolo County—the balance of the county which is characterized by small farming communities.

*Sample size and its allocation to the strata.* To insure that an adequate number of certain minority groups were included in the sample, a disproportionate sampling scheme was adopted whereby households in East Yolo and rural Yolo County were oversampled. The reasons were because the

migrant workers, especially Mexican Americans who are of special interest to this county, with their attendant health problems are concentrated in these areas. The socioeconomic characteristics of the Davis and Woodland strata are more homogeneous than the other two strata.

Based on the study objectives and our previous experience in the country, we decided early in the planning stages of the survey that a sample of about 1,200 households would be necessary. A 5 percent sample yielded a total of 1,336 households for inclusion in the survey. The excess of 136 over the projected need of 1,200 was to allow for expected vacancies and nonresponses.

*Primary and secondary sampling units.* A larger number of enumeration districts than was selected per stratum would have increased costs, fieldwork, and probably would have resulted in a serious organizational difficulty. On the other hand, a smaller number of districts might have resulted in serious "cluster" effects. In considering these difficulties and taking into account the experience from other studies, the final allocation of the sample among first and second stage units in each stratum was adopted, which can be seen from the data in table 1.

The main criteria for choosing the appropriate number of districts to be sampled were cost and assumptions of homogeneity within each stratum. The districts were selected independently within each stratum according to a probability proportional to their size. Households (secondary sampling units) within each district were selected at random; that is, each had an equal probability of being selected. This probability was equal to the sampling fraction (table 1) applied in each stratum.

*Enumeration.* Enumeration preceded the actual health survey and was completed in a 4-week period just before the 1970 U.S. Census. A limit of five callbacks was set for persons not at home in any household during enumeration. Spanish-speaking community health aides were recruited and trained so that enumeration of households with Spanish-speaking persons could be undertaken with minimum difficulty.

*The questionnaire.* The method most suitable to the needs of the study was the personal household interview technique. A general list of variables necessary for the study was developed. The list included information on sociodemographic factors, general environment characteristics of the household, health care service utilization practices,

health care service needs, health care payments and insurance profiles, indexes of chronic disease, injury, and disability, and information on nutrition, smoking habits, mental health, and family planning.

Although most of the information needed for each household could have been obtained from the head of the household, other information was needed from each individual member of the household. We therefore used two different modes of data collection—one for the household and the other for the individual members of each household. Four questionnaires were developed: (a) one for the household, (b) one for children, (c) one for adult males, and (d) one for adult females. For ease of recording, coding, editing, keypunching, and verification, a system of precoded, closed-end multiple-choice questions was incorporated into the overall format.

*Pretest and field trial.* Following an inter-departmental pretest and subsequent revision of the forms, a field trial was scheduled. A random sample of 25 households was selected from addresses in the telephone book of an adjacent county, and the persons in these households were interviewed. After the field trial, a final modified questionnaire was assembled into a booklet after it was reproduced on heavy weight paper. For ease of identification, the different recording instruments were color coded according to the type of intended respondent (that is, household, male adult, female adult, or child).

*The interview.* To achieve the maximum possible interview response, a packet was prepared which contained health education pamphlets and information on a number of related health subjects for distribution to the households. In this packet we include a letter indicating the nature

and usefulness of the literature. A small first-aid kit was also distributed to each household at the time of interview.

Following the first wave of interviewing, all "not-at-home" households were reassigned until five separate visits had been made. Callbacks to these households were specifically scheduled at a date and time of the day different from that of the previous attempt. Midway in the survey, persons in households who had refused to participate or houses which were vacant at the time of enumeration were revisited by an interviewer. Approximately 30 persons in previously vacant or "refusal" households were successfully interviewed on subsequent visits. About 25 of the persons in households originally enumerated either refused to cooperate further, or the houses were vacant at the time of the interview. The entire survey was completed in 4½ weeks.

*Data analysis and definition of terms.* The information collected on the questionnaire was edited for completeness, coded, and keypunched. All cards were verified by machine and transferred to magnetic tapes for analysis by computer. Initial analyses by the computer included one- and two-way frequency distribution for each variable for the county as a whole and for each stratum. As soon as data from the 1970 U.S. Census became available, precise sampling fractions were calculated and the frequency distributions were adjusted to total county population. Based on the review of the marginal tabulations, further analyses were performed commensurate with the objectives of the study. These included derivation of rates, standard errors, and determination of confidence limits.

The data from the Yolo County survey were compared with the figures from the nation given

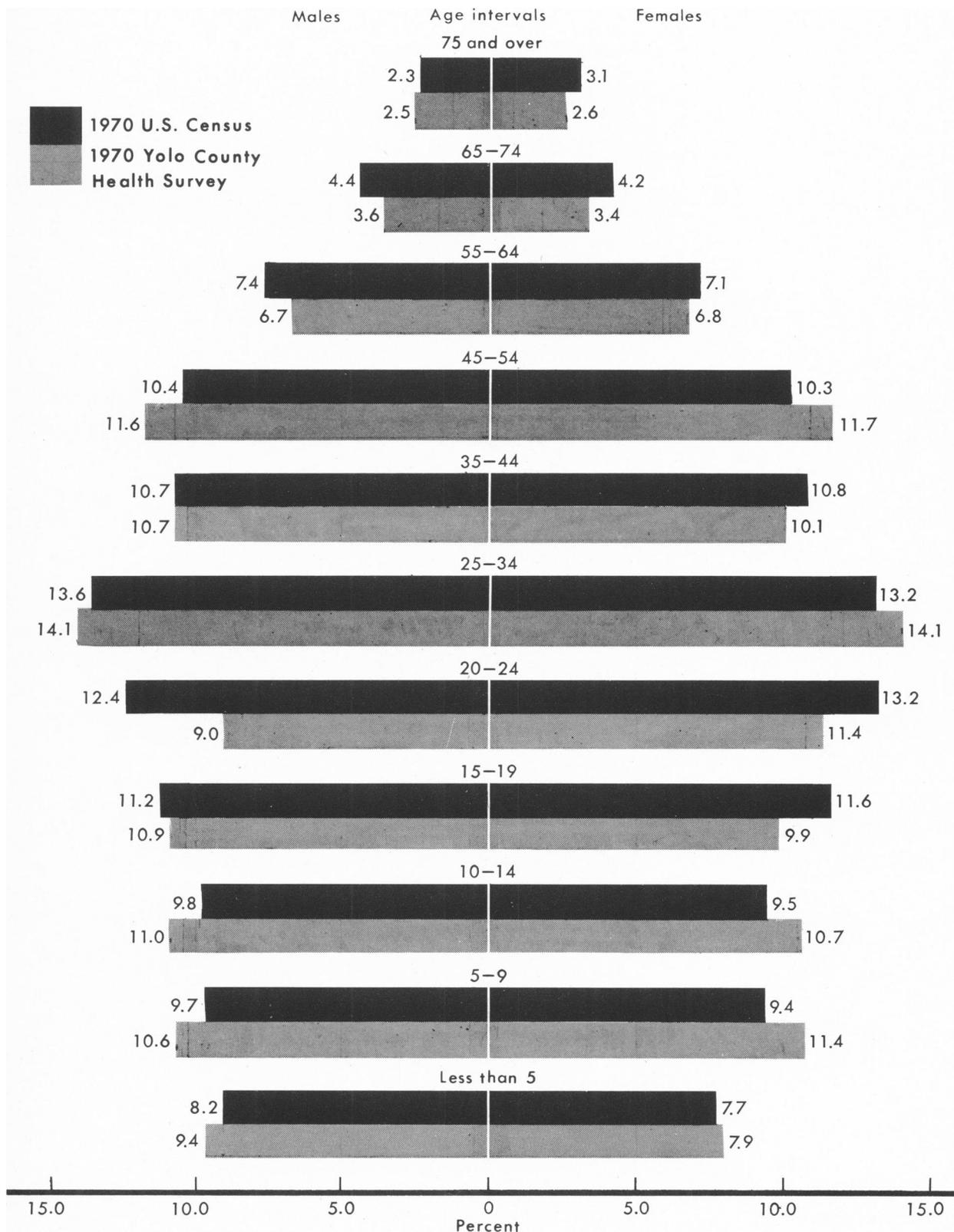
**Table 1. Allocation of primary and secondary sampling units by stratum, 1970 Yolo County Health Survey**

Stratum	Occupied households	Sampling fraction (percent)	Number of districts <sup>1</sup>	Approximate number of—	
				Households per district	Households in sample
Davis.....	7,314	3.0	10	22	219
Woodland.....	6,447	3.0	10	19	193
East Yolo.....	9,274	7.0	20	34	649
Rural Yolo.....	3,930	7.0	35	8	275
Total.....	26,965	5.0	75	83	<sup>2</sup> 1,336

<sup>1</sup> California State Department of Finance Enumeration Districts.

<sup>2</sup> Because of new construction, 7 households were added later, which resulted in a total of 1,343 occupied housing units.

**Figure 1. Comparison of the population of Yolo County, by age and sex, in 1970 U.S. Census and Yolo County Health Survey**



in the 1970 data (5) of the National Health Survey (NHS). More meaningful data, of course, could have been obtained by comparing the Yolo County data with that of the western region of the United States. But, at the time of the analysis of our data, a detailed analysis of the regional findings was not available. By necessity, therefore, we used the national data as a whole. It should be emphasized that where the data from Yolo County were compared with the national findings, the definition of terms used by the NHS was adopted. More specifically, the following definitions are used in this paper.

**Rate of hospitalization.** For determination of rate of hospitalization, the term "hospital episode" used by the NHS was adopted. This term is defined by NHS as ". . . any continuous period of stay of one night or more in a hospital as an inpatient . . ." (5). Thus, the definition rate of hospitalization used in this paper refers to the number of persons with one or more hospital episodes per 1,000 population.

**Length of hospital stay.** The length of hospital stay is defined in the National Health Survey as ". . . the total number of all hospital episodes in the 12 months period . . ." (5). According to this definition, the total number of days per person with hospital episodes used in this paper constitutes the length of hospital stay.

**Physician visit.** A physician visit is defined as consultation with a physician in person. It should be noted that in the National Health Survey definition a consultation by telephone was also included as a physician visit (5), whereas in Yolo County it was not. Thus, the term physician visit used in our analysis refers to the number of visits per person per year.

**Dental visit.** "A dental visit is defined as any visit to a dentist's office for treatment or advice, including services by a technician or hygienist . . ." (5). Thus, the term dentist visit used in this

paper refers to the number of dental visits per person per year.

Finally, the socioeconomic status index was constructed from two factors—education of female spouse and total family income. The actual derivation of this index has been reported elsewhere (6).

## Results

**Response rate.** All but 2.5 percent of the interviews were completed during the first 4 weeks of the survey. The interviews completed in the remaining 2 weeks were due to appointments made at the request of the respondent.

Although originally 1,336 households were selected to sample, 1,445 households were eventually visited because new houses had been built in several of the districts. There were 102 vacant housing units (7.1 percent), leaving 1,343 housing units whose occupants were interviewed. A response was obtained from persons in 1,091 of these units, resulting in a response rate of 81.2 percent per occupied housing units. The refusal rate was 11.9 percent and, after five callbacks, persons in 6.9 percent of the households could not be reached. The response rate varied among the four strata: 93.8 percent in Davis, 83.4 percent in Woodland, 75.1 percent in East Yolo, and 82.7 percent in the rural area of the county.

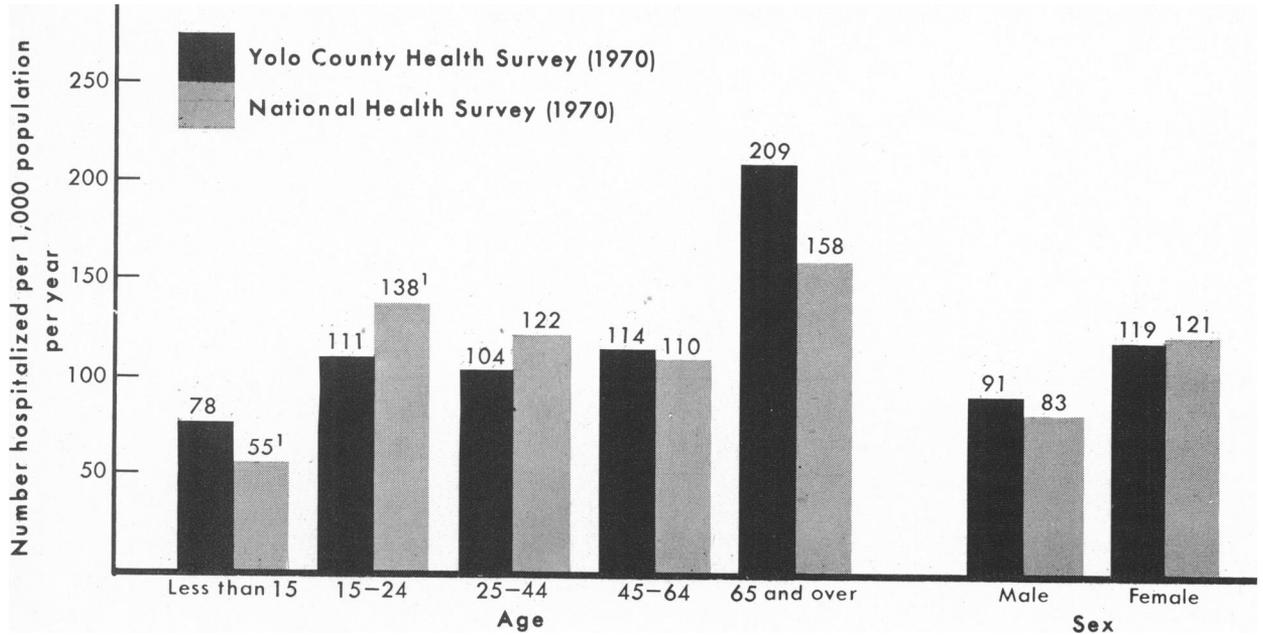
**Comparison with the 1970 census.** In population studies it is desirable that the selected sample be representative of the total population under study. The 1970 U.S. Census preceded the Yolo County survey by 2 months, thus providing the opportunity for comparisons between the survey and the U.S. Census data. The similarity in the proportionate distribution of the sample population by age and sex in comparison with that of the census data is shown in figure 1. Also, there is little difference between the Yolo County survey sample and the 1970 U.S. Census data in the distribution of the population by race (table 2).

The U.S. census data, however, do not differentiate within the white group between Mexican Americans and other whites (table 2). Because of the presumed and often quoted differences in health status of the Mexican Americans in California, it is essential that the Mexican American population in California be identified as a subgroup in population health surveys and that characteristics and patterns of health care use and needs of this group be determined separately.

**Table 2. Percentage distribution of population by race, 1970 U.S. Census and the Yolo County Health Survey**

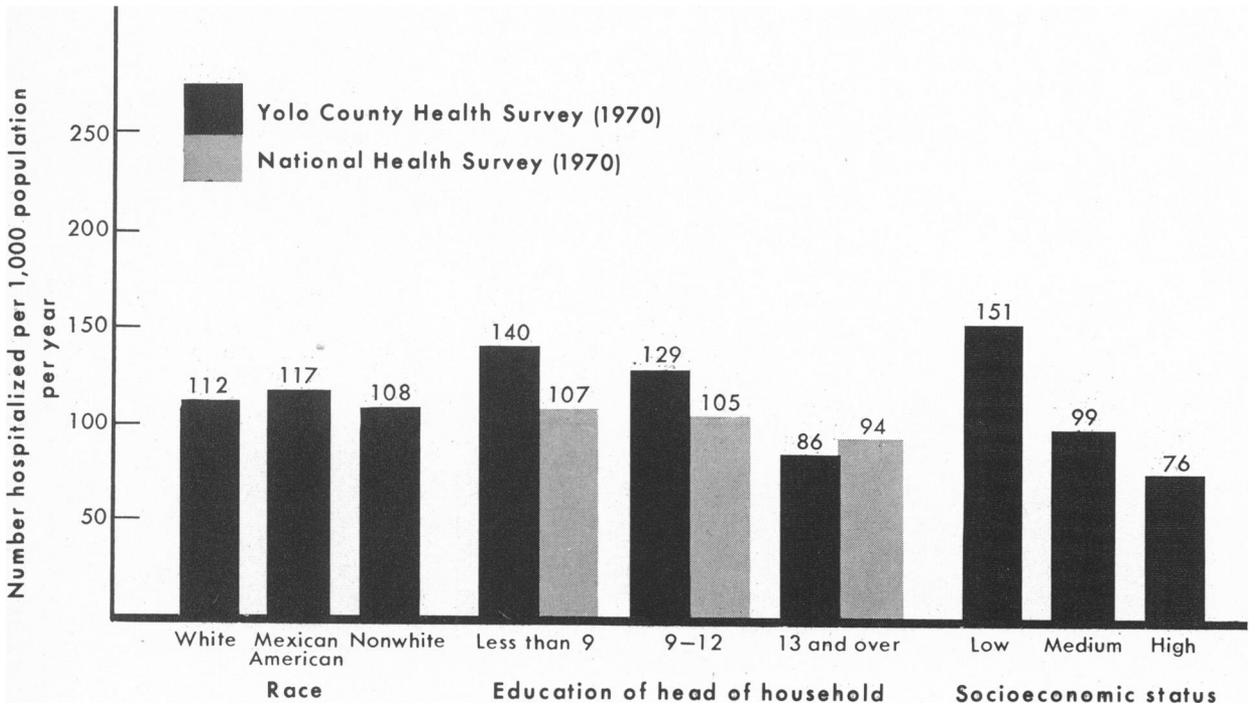
Race	Census	Yolo County survey
White	94.6	82.0
Mexican American	...	12.3
Black	1.2	1.5
American-Indian	.5	1.9
Oriental-Americans	2.6	1.9
Other	1.1	.4

**Figure 2. Comparison of rate of hospitalization, per 1,000 population per year in 1970, by age and sex, National Health Survey and Yolo County Health Survey**



<sup>1</sup> National Health Survey age intervals are 17, 17-24.

**Figure 3. Comparison of rate of hospitalization, per 1,000 population per year in 1970, by race, education of head of household, and socioeconomic status, Yolo County Health Survey and National Health Survey**



**Table 3. Rates of hospitalization per 1,000 population by age and socioeconomic status, 1970 Yolo County Health Survey**

Age group (years)	Socioeconomic status		
	Low	Medium	High
Under 15 .....	89	79	67
15-24 .....	200	100	69
25-44 .....	167	94	92
45-64 .....	153	120	64
65 and older .....	234	183	173

More than 12 percent of the population of Yolo County is Mexican American—the largest minority group in the county.

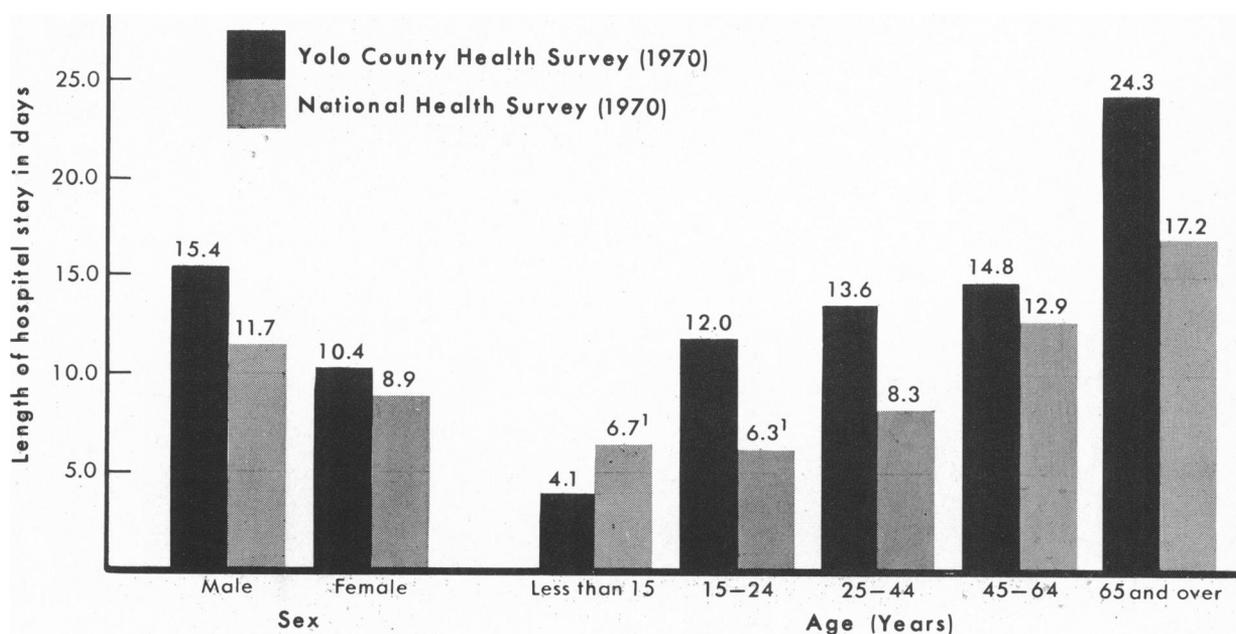
*Hospital utilization.* The rate of hospitalization in Yolo County is 105 per 1,000 population. Hospitalization rates according to age and sex are given in figure 2. The hospitalization rate increases with age—it is highest for those 65 years and older (209 per 1,000 persons) and lowest for those under 15 years of age (78 per 1,000 persons). The age-specific rates of hospitalization in Yolo County appear to be higher for persons under 15 years of age or over 64, but they are lower for those from 15 to 64 years old than for the nation as a whole, as reported by the National Health Survey (5). The rate of

hospitalization according to sex is also summarized in figure 2, and the rate is higher among females than males.

Rates of hospitalization by race, socioeconomic status, and education of the head of household are shown in figure 3. There appears to be no difference in rate of hospitalization by race. There is, however, a gradient between the rate of hospitalization and level of education and socioeconomic status of the head of the household. Rates of hospitalization derived from the National Health Survey are consistent with the findings in Yolo County for only one of the three education intervals; the rate of hospitalization among those with less than 13 years of formal education is noticeably higher in Yolo County than in the United States as a whole. National Health Survey data on rate of hospitalization by race and socioeconomic status are not available for comparison with Yolo County data.

Table 3 presents the rate of hospitalization by socioeconomic status and age. In each age group there is a decreasing rate of hospitalization with increased level of socioeconomic status. Elderly persons (65 and older) of low socioeconomic status have a substantially higher rate of hospitalization than those of the same age group but of medium or high socioeconomic status.

**Figure 4. Comparison of length of hospital stay per person per year in 1970, by age and sex, Yolo County Health Survey and National Health Survey**



<sup>1</sup> National Health Survey age intervals are less than 17, 17-24.

An additional dimension of the utilization of hospital services is length of hospital stay (fig. 4). Length of hospital stay for all persons hospitalized was 12.5 days, and the length of stay increases with age. The length of stay is longer for males than for females. Except for persons under 15 years of age, length of hospital stay is longer for Yolo County than for the nation as a whole.

Length of hospital stay by race and socioeconomic status is shown in figure 5. Length of stay is somewhat higher for nonwhites when compared with whites. Surprisingly, there is little difference in the length of hospital stay between whites and Mexican Americans. For those in the low socioeconomic group, it is significantly higher than for those with medium or high socioeconomic status.

Persons 15 years of age and older in the low socioeconomic group have a longer length of hospital stay than persons of similar age who are in a medium or high socioeconomic group (table 4). Socioeconomic status does not appear to affect the length of hospital stay for persons under 15 years of age. This observation seems to support our empirical impression that not only is the rate of hospitalization higher for the elderly in low socioeconomic groups, but these elderly stay longer than do those of similar age but who have a medium to high socioeconomic status.

*Physician visits.* The number of physician

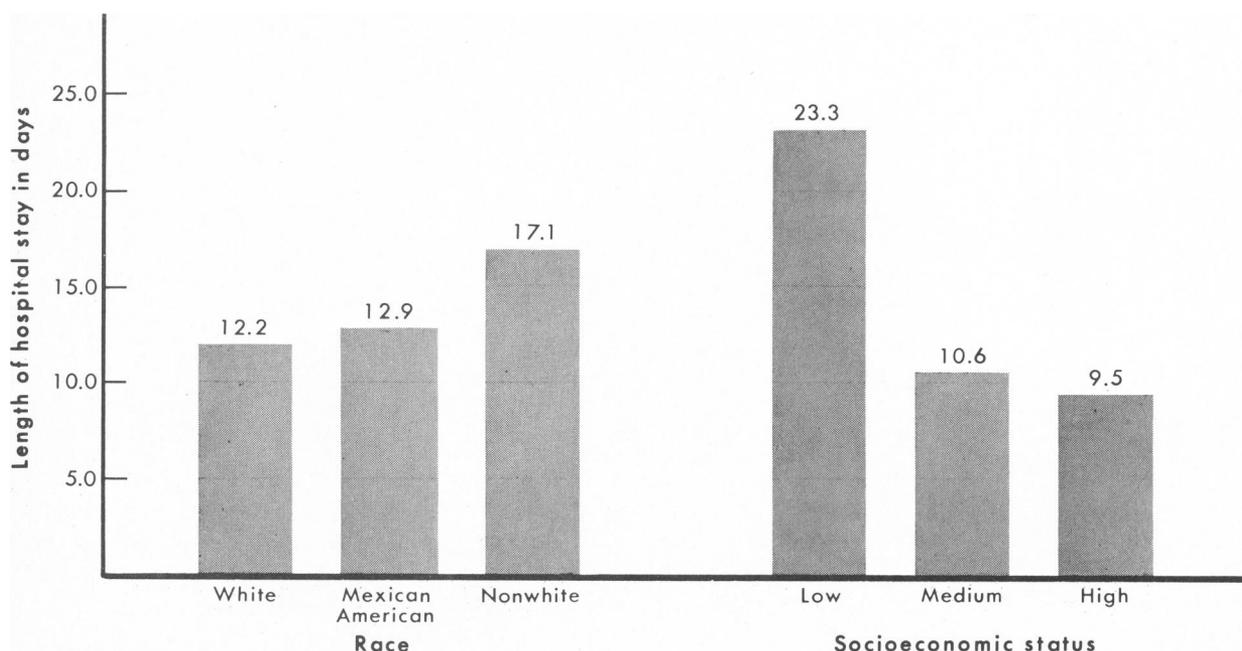
**Table 4. Length of hospital stay per year by age and socioeconomic status, 1970 Yolo County Health Survey**

Age group (years)	Socioeconomic status		
	Low	Medium	High
Under 15 .....	4.0	3.8	4.8
15-24 .....	15.4	11.2	7.0
25-44 .....	14.5	13.9	12.1
45-64 .....	25.9	11.4	5.7
65 and older .....	30.5	14.6	15.0

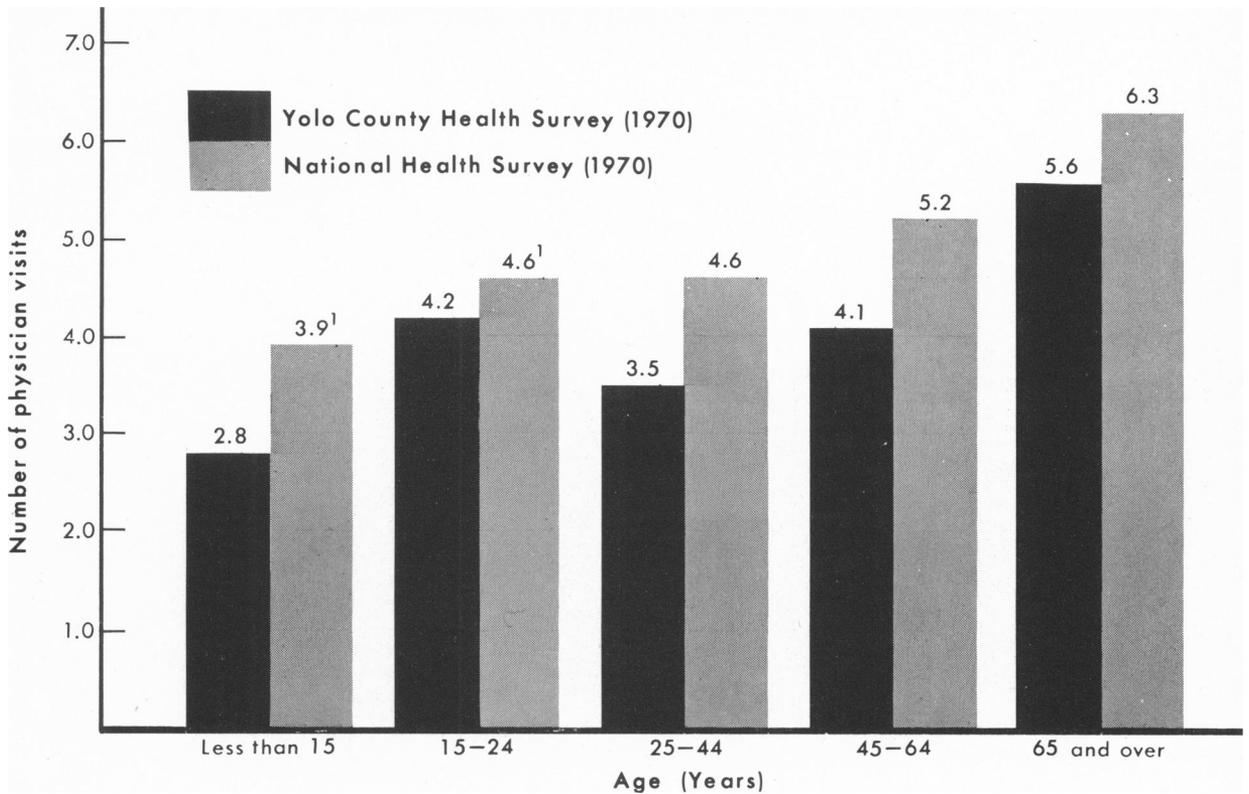
visits in Yolo County for 1970 was 3.6 visits per year, which is somewhat lower than the average number of 4.6 visits reported by the NHS (5). The number of physician visits by age group for Yolo County and the NHS is shown in figure 6. The number of physician visits in Yolo County is lower in each age group than it is in the United States as a whole. As mentioned earlier, in the National Health Survey the physician visit included telephone calls to a physician, whereas in Yolo County it did not. The number of physician visits progresses with increasing age until a peak is reached for those 65 years of age and older.

The number of physician visits according to sex, race, and socioeconomic status is given in figure 7. There is a higher number of physician visits for females than for males, and there seems to be little difference in number of visits by race

**Figure 5. Length of hospital stay per person per year, by race and socioeconomic status, 1970 Yolo County Health Survey**



**Figure 6. Comparison of number of physician visits per person per year in 1970, by age, National Health Survey and Yolo County Health Survey**



<sup>1</sup> National Health Survey age intervals are less than 17, 17-24.

in Yolo County, although nationally a differential in visits is observed (9). Furthermore, there seems to be little difference in number of physician visits according to socioeconomic status.

The number of physician visits by age and socioeconomic status is given in table 5. Persons over age 65 in the high socioeconomic group average slightly more than 10 physician visits per year in contrast to only 4.8 visits by those in the older age and low socioeconomic group. Regardless of socioeconomic status, persons under 15 years of age averaged between two and three

**Table 5. Number of physician visits per person per year according to age and socioeconomic status, 1970 Yolo County Health Survey**

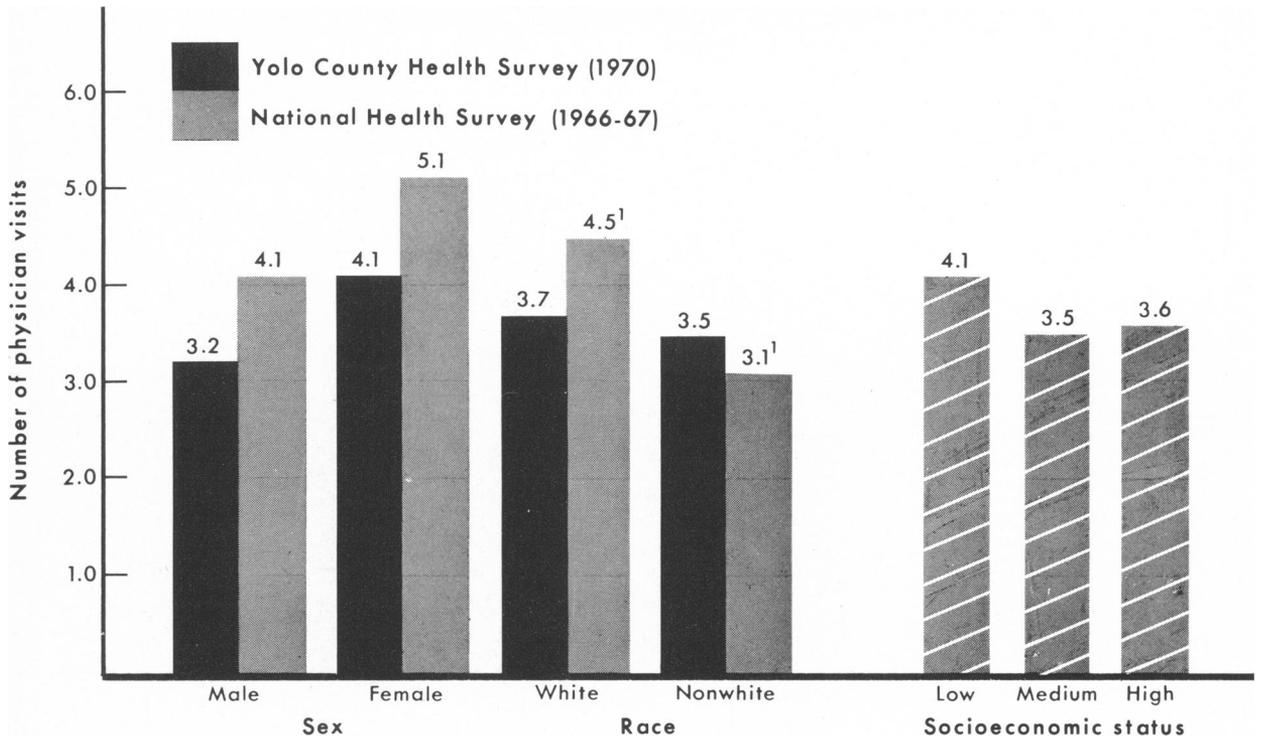
Age group (years)	Socioeconomic status		
	Low	Medium	High
Under 15	2.7	2.8	3.0
15-24	6.6	3.5	4.4
25-44	3.8	3.4	3.5
45-64	4.5	4.3	3.2
65 and older	4.8	5.6	10.1

physician visits per year. There does not seem to be any notable pattern in physician visits within each of the three socioeconomic groups according to age.

*Visits to dentists.* The number of dentist visits per person per year in Yolo County was 1.5—exactly the same as the finding of the NHS (5). Figure 8 presents data on the number of dentist visits in Yolo County and the United States as a whole. The number of dental visits for females is only slightly higher than for males. With advancing age, however, there is a decreasing number of visits to dentists. Also, there are fewer visits to dentists among nonwhites than whites. The distribution of number of dentist visits according to socioeconomic status and education of family head shows more visits for those in the high socioeconomic group or with a higher level of education (fig. 9).

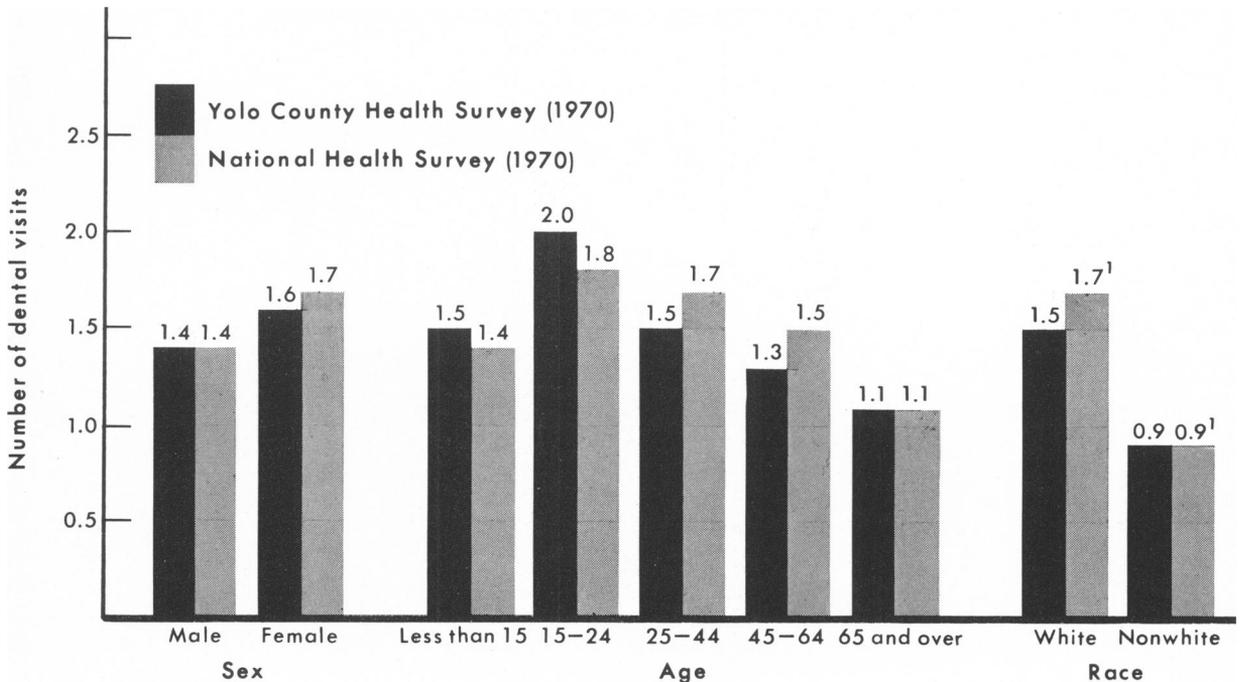
The number of visits to a dentist according to age and socioeconomic status is shown in table 6. Dental care seems to increase with high socioeconomic status regardless of age. Further, older persons of low socioeconomic status have the

**Figure 7. Comparison of number of physician visits per year, by sex, race, and socioeconomic status, National Health Survey and Yolo County Health Survey**



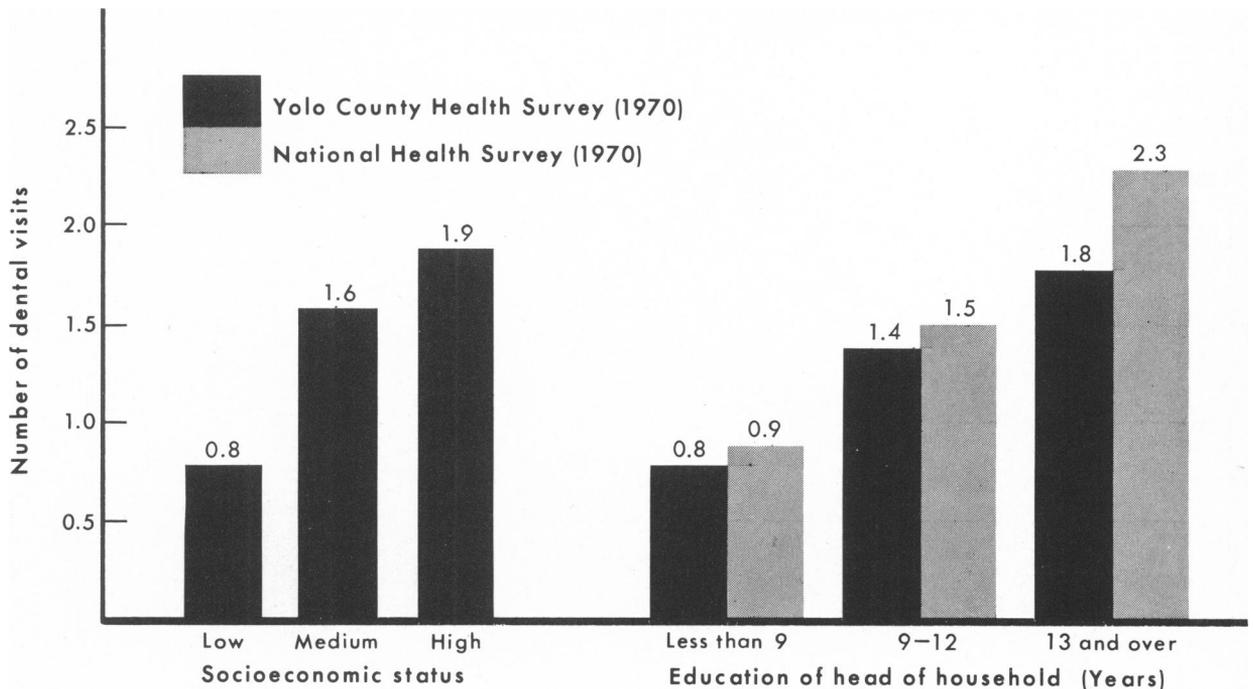
<sup>1</sup> Reference 9.

**Figure 8. Comparison of number of visits to a dentist per person per year in 1970, by sex, age, and race, National Health Survey and Yolo County Health Survey**



<sup>1</sup> Reference 10.

**Figure 9. Comparison of number of visits, to a dentist per person per year in 1970, by socioeconomic status and by education of head of family, Yolo County Health Survey and National Health Survey**



lowest number of visits while older persons of high socioeconomic status have the highest number.

*Yolo County and the western region of the United States.* Data on rate of hospitalization, length of hospital stay, and number of physician and dental visits for the western region of the United States, derived from the 1970 National Health Survey and the Yolo County study, were as follows.

Health care data	Western region (NHS)	Yolo County
Rate of hospitalization per 1,000 persons	134	105
Length of hospital stay (days)	7.3	12.5
Number of physician visits	5.0	3.6
Number of dentist visits	1.7	1.5

The rate of hospitalization is much higher in the western region when compared with Yolo County. Curiously, the length of hospital stay is much higher for residents of Yolo County than for those in the western region. Physician visits are also somewhat higher in the western region than in Yolo County, whereas there seems to be no difference in dentist visits.

*Family size and insurance status.* Table 7 summarizes rate of hospitalization, length of hospital stay, and number of physician and dentist

visits according to family size and status of health insurance. The rate of hospitalization decreases in magnitude with an increase in family size; the highest rate (120 per 1,000 population) is observed among persons whose families have only one or two members. The length of hospital stay and number of physician visits appear to be somewhat higher among persons from small families as compared with those from medium or large families. The number of dentist visits does not seem to be affected by family size.

Approximately 20 percent of all persons in Yolo County have no form of hospital insurance, and about 25 percent lack medical insurance. The rate of hospitalization for persons with hospital insurance increases noticeably when compared

**Table 6. Number of visits to a dentist per person per year according to age and socioeconomic status, 1970 Yolo County Health Survey**

Age group (years)	Socioeconomic status		
	Low	Medium	High
Under 15	0.9	1.5	2.0
15-24	1.2	2.2	2.1
25-44	.9	1.4	1.9
45-64	.7	1.4	1.7
65 and older	.5	1.5	2.6

with those who do not have insurance. Interestingly, the number of physician visits between persons with and without medical insurance coverage does not differ, although persons with medical insurance have a slightly higher number of dentist visits than those without.

*Availability of services.* In addition to degree of utilization, another facet of health care delivery is the dimension of availability and acceptability of services (table 8). Although 58.5 percent of all households in the county consider medical services available and accessible, these services are not locally accessible to more than one-half of them (55.8 percent). That is, 55.8 percent of the persons in households surveyed must go outside the county to obtain their health care services. Furthermore, 57.3 percent of the persons in these households consider the available services in the county unacceptable. In other words, persons from about one of every five households (18.7 percent) go outside the county for medical services. Even though the services are considered "available," these persons consider them unacceptable.

*Relationship between availability and rate of use.* The utilization of hospital, physician, and

dentist services according to availability, accessibility, and acceptability of health care services is summarized in table 9. The rate of hospitalization for persons with either unavailable or inaccessible services (99 per 1,000 persons) is somewhat lower than for persons in households with services both available and accessible to them (109 per 1,000 persons).

There seems to be little or no difference, however, among these two groups in length of hospital stay and number of physician or dentist visits. Persons with available but non-locally accessible services appear to be hospitalized slightly more frequently (115 per 1,000 persons) but have a shorter stay (11.5 days) than persons where health care services are not available or are not accessible. Finally, persons who use services which are non-locally available and accessible, because local services are in their opinion not acceptable, appear to have a slightly higher rate of hospitalization (110 per 1,000 population) than the rate for persons (99 per 1,000 population) in households with services that are either not available or not accessible in the county.

The data in table 9 suggest that the notions of

**Table 7. Utilization of hospital, physician, and dentist services according to family size and health insurance**

Family size	Number of persons	Rate of hospitalization (per 1,000 persons)	Length of hospital stay (days)	Number of physician visits	Number of dentist visits
1-2.....	746	120	19.1	4.5	1.4
3-4.....	1,229	106	9.7	3.7	1.6
5-6.....	965	106	10.0	3.2	1.5
7 and over.....	459	75	12.7	2.9	1.6
Insurance status:					
Hospital insurance.....	2,731	<sup>1</sup> 115	<sup>1</sup> 12.4	.....	.....
Medical insurance.....	2,640	.....	.....	<sup>2</sup> 3.7	<sup>2</sup> 1.6
No hospital insurance.....	668	<sup>1</sup> 103	<sup>1</sup> 13.0	.....	.....
No medical insurance.....	759	.....	.....	<sup>2</sup> 3.7	<sup>2</sup> 1.2

<sup>1</sup> Rate derived for persons with and without hospitalization insurance.

<sup>2</sup> Rate derived for persons with and without medical insurance.

**Table 8. The availability, accessibility, and acceptability of health care services in Yolo County, 1970 Yolo County Health Survey**

Status of use of health care services	Number of households	Percent		
Total households studied .....	1,091	100.0		
Health care services available and accessible	638	58.5	100.0	
Health care available, but local services not accessible .....	356	32.6	55.8	100.0
Health care available, but local services not acceptable .....	204	18.7	32.0	57.3

**Table 9. The relationship between availability, accessibility, acceptability, and utilization of hospital, physician, and dentist services**

Health care services	Households	Persons	Rate of hospitalization per 1,000 population	Length of hospital stay (days)	Number of physician visits	Number of dentist visits
Households studied.....	1,091	3,399	105	12.5	3.6	1.5
Available and accessible.....	638	2,053	109	13.3	3.6	1.5
Available but not locally accessible.....	356	1,190	115	11.5	4.2	1.7
Available services unacceptable.....	204	617	110	13.1	4.4	1.7
Local services either unavailable or inaccessible.....	453	1,347	99	13.6	3.6	1.5

availability, accessibility, and acceptability of health care services do not greatly influence the frequency of use of hospital, physician, and dentist services, with the possible exception that perhaps persons for whom health care services are available but not locally accessible seem to experience a slightly higher rate of hospitalization than others.

**Discussion**

There are several widely recognized dimensions of utilization of health care services. These include use of hospitals, physicians, and dentists—to mention the most popular. Within these dimensions are various indexes of use, such as number and length of visits and type of use. For purposes of this report, the dimension of utilization of services included visits to physicians and dentists and their variations based on age, sex, socioeconomic status, race, and education of head of household. The relative importance of utilization of services as one major component of health care delivery is illustrated by its frequent use in the National Health Interview Survey (7). One question that remains unanswered, of course, is the consistency of household interview data on utilization and utilization data derived from institutional or medical records. Experience from the National Health Interview Survey (8) indicates that there is a notable and consistent degree of underreporting on hospital use even under controlled interview procedures. It is safe to say, therefore, that reports of hospital utilization experiences are underestimated in this report.

It should be remembered, however, that utilization of services is but one indicator of the epidemiologic variation of health care delivery in the community. The data from Yolo County indicate that there is a high rate of hospitalization for persons 65 years of age and older. Within

each age group, except for those under 15, the rate of hospitalization is higher nationally (1970 National Health Survey data) than it is in Yolo County.

Although there is an increasing gradient in rate of hospitalization with advancing age, the magnitude of this gradient is much larger for those of low socioeconomic status when compared with those in high socioeconomic status groups. This increase seems to indicate a level of more acute illness necessitating hospitalization among the elderly poor when compared with the more affluent elderly members of the community.

An interesting observation in this study is that although the rate of hospitalization is higher for females than for males, the average length of hospitalization for males is higher than for females. A shorter length of hospital stay for females may, of course, reflect the large number of obstetrical patients who stay only 2 or 3 days. It also appears that persons 65 years of age and older not only have the highest rate of hospitalization, but also they stay much longer than younger persons. Furthermore, persons over 65 years of age in low socioeconomic groups are hospitalized longer than those of similar age but of high socioeconomic status. This longer stay seems to imply that these older persons may need longer periods of time for recovery because their illness or disability, which resulted in hospitalization, may be more serious.

The higher rate of hospitalization for nonwhites as compared with whites and Mexican Americans is intriguing and suggests further study to obtain an explanation. Perhaps the signs and symptoms noted by the physician at the initial visit are far more aggravated among these persons, and therefore they require hospitalization.

With regard to number of visits to dentists, it appears that regardless of sex, race, socio-

economic status, or education of the head of the household, there are notably fewer numbers of visits to a dentist than recommended by the dental authorities. Indeed, in only two age groups does the number of visits to dentists approach the desirable figure of two visits to a dentist per year. Among the nonwhite, low socioeconomic group, the mean number of visits is far below what it should be by accepted standards of preventive dental care.

Notable differences were seen in rates of hospitalization and length of hospital stay between the western region of the United States and Yolo County. No variations in definitions could explain these differences, and no other reason is readily apparent.

Persons in families with only one or two members have a higher rate of hospitalization, longer hospital stays, and a larger number of physician visits than those in medium or large families. Persons in small families are either young, single or married persons or older married persons. Small families could explain the higher frequency of use of hospital and physician services. Persons with hospital insurance seem to be hospitalized more frequently than those without insurance. The availability of hospital insurance coverage for elective hospitalizations could possibly explain this observation.

The criteria of availability, accessibility, and acceptability are at best subjective parameters and difficult to describe and measure. Our data indicate that although gross variations in rate of hospitalization, length of hospital stay, and frequency of physician or dentist visits could not be ascertained, the large proportion of persons in households with, in their opinion, unacceptable health care services in the county cannot be overlooked in an evaluation of a health care system in the community.

Finally, it should be remembered that this report focused on the factors of utilization of hospitals and physicians' and dentists' services, evaluated in a unidimensional analysis with re-

spect to certain selected epidemiologic parameters. The interaction and interrelationship of these and other factors that describe the health care system in conjunction with yet additional epidemiologic parameters must be carefully evaluated, perhaps through the use of multifactor analyses. Such analyses are beyond the scope of this report and will be dealt with in another study.

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